

For Period Ending 1 February 1974

A. Title of Investigation:

Evaluation of the Application of ERTS-1 Data to the Regional Land
Use Planning Process, Proposal #058, Contract #NAS 5-21754.

B. GSFC Identification Number of Principal Investigator:

James L. Clapp, UN 040

C. Statement of Any Problems Impeding Progress of Investigation:

1. We did not receive the I²S additive color viewing system until the first week of February and have therefore been unable to perform our own color enhancement of imagery. This has handicapped our efforts to improve our interpretation of natural resource data from ERTS imagery which has been largely done using black and white imagery. We plan to begin this work now but the delay encountered due to the lack of this system has impeded the investigation.
2. The McIDAS system, which is believed to be the most promising method for interpretation from ERTS data, has been inoperative since mid-December due to a failure in the disc storage system. Therefore, no further research with the hardware of this system has been done since the last reporting period.
3. At the inception of the contract the operating personnel consisted of three Principal Investigators (not funded), one full-time Project Coordinator, and three half-time Research Assistants. Since that time the funded staff has been reduced to one full-time Project Coordinator and one half-time Research Assistant. This reduction in operating personnel has been necessitated by the shortage of available funds. Consequently, active research has been reduced due to the lack of available funding to support the personnel and resources required to maintain the previous level of activity.

D. Discussion of Accomplishments During Reporting Period and Those Planned for Next Reporting Period:

1. We are about to complete the final revisions for a report prepared for the State of Wisconsin Department of Administration, which

details our work as it specifically relates to the planning needs of the State of Wisconsin. Members of the state planning staff have acted in an advisory capacity throughout the duration of this research so that the efforts of the University of Wisconsin could be concentrated on significant problem areas determined by the State officials. This aspect of the research is considered significant because the attempt has been made to involve the actual data users in decisions which determine the direction of the research effort. It is hoped that the acceptance and subsequent evaluation of this report by the Department of Administration will provide a reliable indication of the usefulness of ERTS-1 data at the state level of planning.

2. Work has recently begun at the University of Wisconsin which concerns the use of ERTS-1 data for the Water Quality Monitoring Program of the State of Wisconsin Department of Natural Resources (DNR). The DNR is seeking a means for evaluating every lake within the State of Wisconsin in terms of their trophic status and because of the manpower requirement for doing this on the ground it is hoped that remote sensing data can be used to provide a workable method. The initial stage of work has consisted of attempting to find a correlation between water quality parameters (turbidity, suspended solids, etc.) which serve as indicators of trophic status and the reflectance characteristics of the lakes as measured on ERTS imagery. Accordingly, twenty lakes for which ground truth was taken by the DNR at approximately the same time as an ERTS overflight (mid-July 1973) were selected for study. These lakes were located on three different ERTS frames for each of the four MSS bands and density readings on the films were taken at the center of each lake using a microdensitometer. Regression analysis of this data has shown a definite correlation between the reflected energy as sensed by the satellite and the trophic status of the lakes as determined by DNR water quality parameters. On the basis of these results, the DNR has decided to employ three students to work under Dr. Frank Scarpace of the University of Wisconsin, Environmental Monitoring and Data Acquisition Group, to make a similar assessment of every lake within the State of Wisconsin from ERTS-1 data.

3. Progress in the development of the McIDAS system (Man-Computer Interactive Data Access System) has been limited during this reporting period due to the fact that the disc storage system was inoperative from mid-December through mid-February. During this time, work was concentrated on a thorough inventory of the routines developed for the NASA ASTEP computer programs to determine which routines would be useful for incorporation into the McIDAS system for the interpretation of ERTS-1 data.
4. Contact was made with representatives of the Bay Lake Regional Planning Commission who are interested in utilizing remote sensing methods for constructing a natural resource data base for the northeastern portion of Wisconsin. The members of the commission have expressed their interest in exploring the utility of ERTS-1 data for their planning requirements. It was consequently agreed upon that the expertise of the ERTS-1 research staff at the University of Wisconsin would be made available to the commission so that mutual benefits could be gained.

E. Discussion of Significant Results:

During the month of December, the investigators concentrated their efforts toward assessing the achievements of the current ERTS-1 research so that significant results could be incorporated into the updated version of their ERTS-B research proposal which was delivered to NASA-GSFC on 21 December 1973. The preparation of this proposal revision drew heavily upon our ERTS-1 experience. Significant progress was made in the development of operational mechanisms, linking the research community at the University and the operation agencies of the State of Wisconsin. These mechanisms are detailed in Appendix I, "Selections from ERTS-B Management Proposal," and Appendix II, "Copies of Related Correspondence with State Agencies."

During January, an effort has been made to finalize a report which is being prepared for the State of Wisconsin Department of Administration, evaluating the applicability of ERTS-1 to the planning needs of the State of Wisconsin. This document is intended to assess the degree of utility of the satellite for providing information which has been designated by state planners as essential to their needs. This effort is considered highly significant to the overall research program since

a situation has been created in which a prime potential user of ERTS type data has been given the opportunity to determine the direction of the research. This report is scheduled for completion by the end of February.

F. Listing of Published Papers, Articles:

None during this reporting period.

G. Recommendations Concerning Utilization of the ERTS System:

None at this time.

H. Standing Order Changes:

None at this time.

I. ERTS Image Descriptor Form:

See Appendix III.

J. Data Request Forms Submitted During Reporting Period:

See Appendix IV.

5.

APPENDIX I

SELECTIONS FROM ERTS-B MANAGEMENT PROPOSAL

6.

PART I

TECHNICAL PROPOSAL

1.0 INTRODUCTION

1.1 SUMMARY ABSTRACT

This proposal is a management proposal. It provides for the management and coordination of the four investigations using data from the Earth Resources Technology Satellite submitted from the Institute for Environmental Studies of the University of Wisconsin-Madison in cooperation with the State of Wisconsin Department of Administration, Department of Natural Resources, Department of Transportation, and Office of Emergency Energy Assistance. These four investigations are entitled:

- A. The Use of ERTS Data to Inventory and Monitor Critical Land Resources for Statewide Planning and Management
- B. Lake Eutrophication and Turbidity Studies in Wisconsin
- C. Application of ERTS Data to Estimate Statewide Allocation of Distillate Fuels by Monitoring Snow Cover Albedo
- D. ERTS Application to Inventory, Monitor and Map Wetlands and Related Resources for Planning, Management and Regulation.

Proposals for these investigations precede this proposal.

1.2 BACKGROUND

The problems of management, coordination, and relationship of four separate but related projects rather than one single scientific inquiry are presented here. This section is dependent upon each of the separate proposals preceding in Part I.

Our experience has emphasized the importance of providing for effective management and coordination in investigations involving remote sensing in order to make the most efficient use of personnel, data, equipment and ground truth. When the further complications of cooperation between a University researcher and representatives of operational agencies of state government become part of the investigation the importance of providing effective management linkages between the cooperating units is increased. Communication between different sectors of the projects must move beyond the discussion level.

These basic principles are derived from our experience since 1967 under a NASA grant from the Office of University Affairs to the University of Wisconsin-Madison entitled "Multidisciplinary Research on the Application

of Remote Sensing to Water Resources Problems," and our experience under a NASA ERTS-1 contract entitled "Investigations of the Application of ERTS Satellite Data to the Land Use Planning Process."

1.2.1 THE MANAGEMENT PROBLEM

Four related elements of the management problem are introduced by the investigations proposed. These are:

1.2.1.1 ADMINISTRATION AND COORDINATION

Those functions associated with the operational support of any complex research activity including: (1) fiscal administration, (2) orderly receipt and storage of data, (3) effective coordination of personnel and equipment, and (4) resolution of problems of priorities.

1.2.1.2 THE DATA/INFORMATION FLOW SEQUENCE

In any remote sensing activity, be it operational or research, four basic functions can be identified. These are illustrated in Figure I-1 below as they apply to the ERTS investigations being proposed.

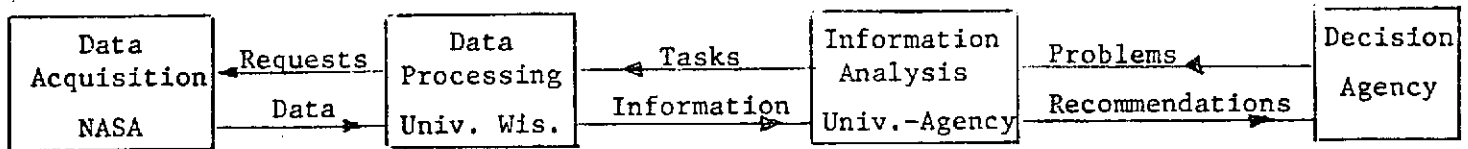


Figure I-1
Data/Information Flow Sequence

To insure that each of these functions is fulfilled in each investigation is a management responsibility. In the past, the function most difficult to recognize and achieve has been information analysis. At times it has been neglected entirely and the data processing function directly linked to the decision function. This has been a major cause in producing the remote sensing applications gap.

1.2.1.3 UNIVERSITY-STATE GOVERNMENTAL AGENCY INTERFACE

Although this aspect of the management problem is not present in all remote sensing operations it is very much an element in the research proposed in these investigations.

The basic responsibility of the University is education, while the basic responsibility of a state governmental agency is operational. On any cooperative research effort between these units, the interface must be constantly monitored in order to assure that the proposed focus of the research is maintained. Further, if during the course of the investigation it becomes necessary or desirable to change the direction of the research, this interface must function to insure that the new direction is compatible with both the requirements of the agency and the basic educational mission of the University. If, in some cases, differences cannot be resolved at this interface, there should be a mechanism to resolve differences at some other level.

1.2.1.4 TECHNOLOGY SHOVE-NEED PULL INTERFACE

Because the investigations proposed all relate to the application of ERTS generated data to problems confronted by state governmental agencies, the investigations are all involved in the transfer of technology. In those cases where technology transfer has been most effectively accomplished in the past, a clear linkage between the technology and the need was present. This requires a working-level contact between the researcher who knows the technology and the operational person who knows the need. In the past, because they did not include working level contact, Advisory Committees meeting at periodic intervals were not effective in solving this aspect of the management problem.

PART II MANAGEMENT PROPOSAL

1.2 SPECIFIC MANAGEMENT FUNCTIONS

The management structure proposed is shown diagrammatically in Figure II-3.

1.2.1 ADMINISTRATION AND COORDINATION

The Director of the Environmental Monitoring and Data Acquisition Group, Dr. James L. Clapp, shall be responsible for the administration and coordination of the ERTS investigations included in this proposal. In order that maximum coordination be achieved, he shall be assisted by a Coordinating Committee. The Coordinating Committee will consist of the Principal Investigators of the four separate investigations plus a representative of the Department of Administration, the Department of Natural Resources, the Department of Transportation, and the State Office of Emergency Energy Assistance. The Director of EMDAG will act as chairman of the Coordinating Committee. The Coordinating Committee, in addition to its responsibilities for coordination, shall be charged with resolving problems of priorities.

1.2.2 THE DATA/INFORMATION FLOW SEQUENCE

The Director of EMDAG shall be responsible for receipt of data/information from NASA and its orderly and timely distribution to the Principal Investigators. In addition, he shall be responsible for maintaining an effective storage and retrieval system for all data/information in order that it be available to all related investigations. Each Principal Investigator, upon receipt of data/information from the Director, shall be responsible for the flow as it applies to his particular investigation. In particular, the Principal Investigators are responsible for assuring that the appropriate state agency personnel are a part of the flow sequence.

1.2.3 THE UNIVERSITY-STATE AGENCY INTERFACE

In order that the University research effort be directed and maintained consonant with the needs of the operational state agencies,

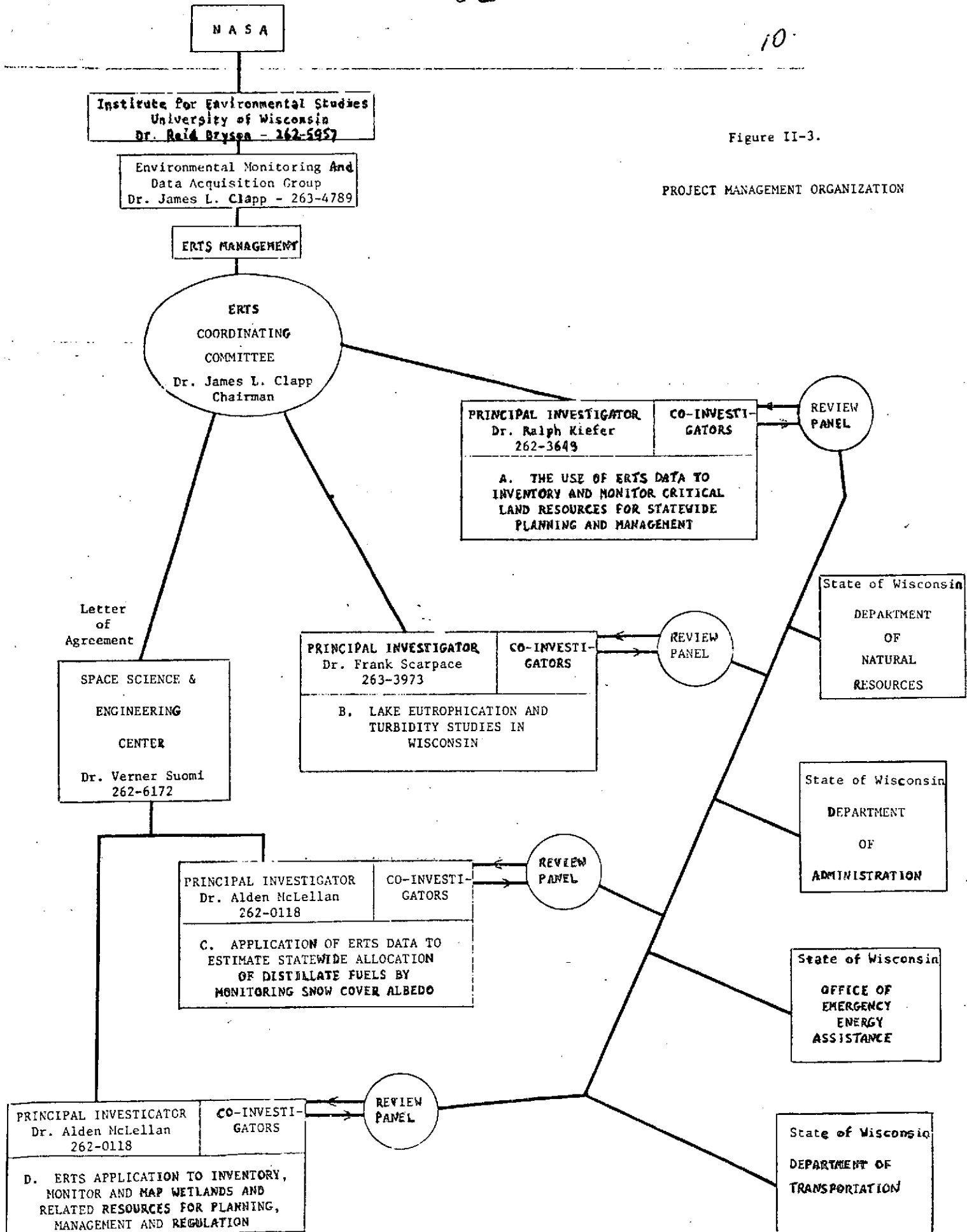


Figure II-3.

PROJECT MANAGEMENT ORGANIZATION

11-

a Review Panel has been established for each of the four investigations. These Review Panels have three functions:

- (1) to participate in establishing the project definition and objectives,
- (2) to maintain the direction and the focus of the project upon the agencies' needs via a review process, and
- (3) to evaluate the results of the project at the conclusion of the funding period.

It is anticipated that the panel members may carry a benefit to their respective agencies by becoming more knowledgeable of the capabilities and limitations of satellite remote sensing.

In order to meet these functions the panels will meet with the research team a minimum of three times during the funding year, typically at the beginning, mid-point, and end, to review the project to date and to consider future direction. As a product of each review, the panel will prepare a report which will include its evaluation and recommendations. Copies will be sent to: (a) the Principal Investigator; (b) the State agencies involved; (c) the Director of EMDAG; and (d) NASA, by inclusion as an appendix in the appropriate periodic report. It is the intent of this procedure to force real dialogue between the researchers and the user agencies. It is hoped that by this process problems, both defined and undefined, will be exposed as they develop during the course of the investigations. In the past, some problems have not been brought to light until after the submission of the final project report. The Review Panels are described in detail in the research proposals.

1.2.4 TECHNOLOGY SHOVE-NEED PULL INTERFACE

Although the interface element is closely related to the University-State Agency element of the management problem, it cannot be met by the same mechanism. Since the Technology Shove-Need Pull Interface specifically deals with the transfer of technology, contact at the working level is required at a frequency much greater than the Review Panel meetings. Therefore, each investigation has identified a Co-Investigator (or Co-Investigators) from the appropriate units of the involved agencies. These Co-Investigators, along with the Principal

Investigators, are responsible for the day-to-day efforts to meet the objectives of the project as defined by the proposal and monitored by the review panels. The Co-Investigators are identified by name in the research proposals.

APPENDIX II

COPIES OF RELATED CORRESPONDENCE WITH STATE AGENCIES



STATE OF WISCONSIN
OFFICE OF THE GOVERNOR
MADISON, WISCONSIN 53702

14.

PATRICK J. LUCEY
GOVERNOR

December 19, 1973

James L. Clapp, Director
Environmental Monitoring and Data
Acquisition Group
University of Wisconsin
Institute for Environmental Studies
Madison, Wisconsin 53706

Dear Professor Clapp:

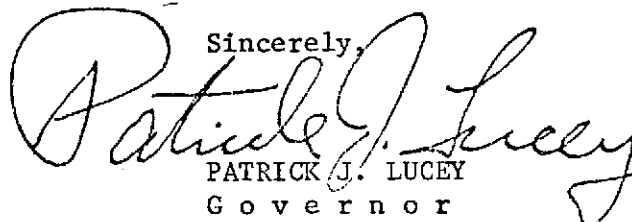
Approximately one year ago I wrote to your associate Dr. Ralph Kiefer in support of his proposal "The Use of ERTS Data to Inventory and Monitor Critical Land Resources for Statewide Planning and Management." Recently I have become familiar with other University of Wisconsin ERTS proposals: "Lake Eutrophication and Turbidity Studies in Wisconsin", "Application of ERTS Data to Estimate State-wide Allocation of Distillate Fuels by Monitoring Snow Albedo," and "ERTS Application to Inventory and Monitor and Map Wetlands and Related Resources for Planning Management and Regulation."

I am encouraged by the high degree of state agency project involvement. This will allow findings to be applied immediately to the solution of some of this state's most difficult and pressing resource and energy problems. As I related to Dr. Kiefer previously I am greatly heartened by these efforts to renew the "Wisconsin Idea." Integration of University and governmental cooperation can only result in betterment for the people of the state.

Finding solutions to our most difficult problems requires the application of expertise from diverse backgrounds. It is not enough merely to bring together a series of related studies. Rather it is essential to direct all aspects of the program in an integrated manner toward compatible goals. I was pleased to learn that this is the basis for your proposal "Management of Multi-disciplinary ERTS Projects."

I wish you success in your endeavors.

Sincerely,


PATRICK J. LUCEY
Governor



STATE OF WISCONSIN
OFFICE OF THE GOVERNOR
MADISON, WISCONSIN 53702

15

PATRICK J. LUCEY
GOVERNOR

January 29, 1973

Dr. Ralph W. Kiefer
Room 2210, Engineering Building
University of Wisconsin
Madison, Wisconsin 53706

Dear Doctor Kiefer:

I have been apprised of your proposal "The Use of ERTS Data to Inventory and Monitor Critical Land Resources for State-wide Planning and Management." I commend you on your effort to renew the "Wisconsin Idea" of integrated university and governmental cooperation for the betterment of the citizens of the state. This concept is consistent with the efforts of the Wisconsin Land Resource Committee and the University of Wisconsin Faculty Land Use Seminar.

With the advent of the Coastal Zone Management Act, the Rural Development Act and other federal legislation related to land use and resource management, the evaluation of the continuous monitoring potential of the ERTS satellite will better prepare us to utilize the technology available to meet the growing public concern for our limited resources.

The particular thrust of your proposal toward critical resource concerns and the proposed National Land Use Policy, a program to which I intend to lend my support, has high potential value to both state and regional levels of planning.

I wish you success in you endeavors.

Sincerely,

Patrick J. Lucey
PATRICK J. LUCEY
Governor

PJL/jho



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES /6.

L. P. Voigt
Secretary

December 17, 1973

BOX 450
MADISON, WISCONSIN 53701IN REPLY REFER TO: 1440

Dr. Ralph W. Kiefer
2210 Engineering Building
University of Wisconsin
Madison, Wisconsin 53706

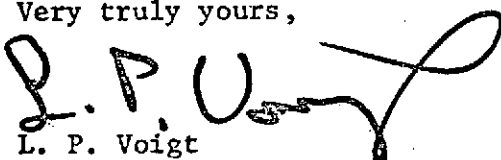
Dear Dr. Kiefer:

I have been appraised of your proposal "The Use of ERTS Data to Inventory and Monitor Critical Land Resources for Statewide Planning and Management." I commend you on your effort to continue the idea of integrated university and DNR cooperation for improved responsiveness and stewardship of our natural resources. This concept is consistent with the efforts and recommendations of the Natural Resources Council of State Agencies and the University of Wisconsin Faculty Land Use Seminar.

The possibility of state legislation related to wetlands inventory and preservation makes the evaluation of the continuous monitoring potential of the ERTS satellite data and imagery combined with other potential sources of imagery of added importance to this Department.

To this end, we are willing to provide access to DNR equipment and to provide personnel time and expertise to assist whenever possible. Our Bureau of Planning will coordinate DNR's input to the total effort.

Very truly yours,


L. P. Voigt
Secretary



State of Wisconsin \ DEPARTMENT OF ADMINISTRATION

17.

Patrick J. Lucey
Governor

Joe E. Nusbaum
Secretary

1 WEST WILSON STREET
MADISON, WISCONSIN 53702
(608) 266-1741

December 18, 1973

Doctor James L. Clapp, Director
Environmental Monitoring and Data Acquisition
Institute for Environmental Studies
University of Wisconsin
Madison, Wisconsin 53706

Dear Doctor Clapp:

I have been apprised of your efforts to extend the University and state agency interaction in the revision of your ERTS research proposal "The Use of ERTS Data To Inventory and Monitor Critical Land Resources for Statewide Planning and Management." We are pleased that the Department of Natural Resources has indicated a willingness to join our Department in this program.

The state's Critical Resources Information Program, the coastal zone management effort, as well as pending state legislation on wetland preservation and land use planning can all potentially benefit from the proposed ERTS follow-on-research.

The Department is willing to continue its involvement in the research through the provision of staff time for review and analysis of research applicability to ongoing programs as well as technical involvement in direction setting. I have asked the State Planning Office in the Bureau of Planning and Budget to coordinate these activities.

Sincerely,

Joe E. Nusbaum
Secretary

JN: jw



State of Wisconsin

DEPARTMENT OF NATURAL RESOURCES

L. P. Voigt
Secretary

December 20, 1973

BOX 450
MADISON, WISCONSIN 53701

IN REPLY REFER TO: 3200

Dr. Frank L. Scarpace
1403 Meteorology and Space Science Bldg.
1225 West Dayton Street
University of Wisconsin
Madison, Wisconsin

Dear Dr. Scarpace:

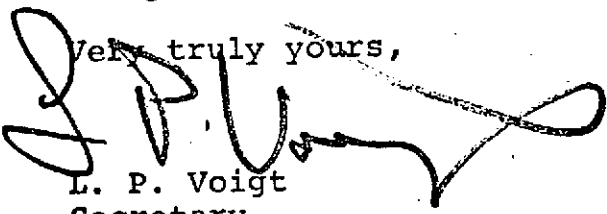
I am pleased to hear of your plans concerning cooperation with the Department of Natural Resources to assess lake eutrophication and turbidity in Wisconsin.

We believe remote sensing will be a very useful and perhaps essential tool in making lake classifications, and will be happy to cooperate with your group in any such endeavor, as we have in our cooperative effort to monitor the thermal discharges on Lake Michigan.

There are plans to allocate personnel to classify lakes as to their level of eutrophication next year. We would assign one man half-time to coordinate the research in this proposal with the Department. I expect all these people will work closely with this investigation.

Our DC-3 aircraft, together with crew, will be available whenever possible to fly photographic or thermal scanning missions in support of this project. We would expect to be able to fly at least five missions during the summer and early fall. The cost will be as per our existing agreement.

Very truly yours,


L. P. Voigt
Secretary



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES 19.

L. P. Voigt
Secretary

December 17, 1973

BOX 450
MADISON, WISCONSIN 53701

IN REPLY REFER TO: 1440

Dr. Alden McLellan
1225 West Dayton Street
Space Science & Engineering Center
University of Wisconsin
Madison, Wisconsin 53706

Dear Dr. McLellan:

I have been appraised of your proposal "ERTS Application to Inventory, Monitor and Map Wetlands and Related Resources for Planning, Management and Regulation." I commend you on your effort to continue the idea of integrated university and DNR cooperation for improved responsiveness and stewardship of our natural resources. This concept is consistent with the efforts and recommendations of the Natural Resources Council of State Agencies and the University of Wisconsin Faculty Land Use Seminar.

The possibility of state legislation related to wetlands inventory and preservation makes the evaluation of the continuous monitoring potential of the ERTS satellite data and imagery combined with other potential sources of imagery of added importance to this Department.

To this end, we are willing to provide access to DNR equipment and to provide personnel time and expertise to assist whenever possible. Our Bureau of Planning will coordinate DNR's input to the total effort.

Very truly yours,

A handwritten signature in dark ink, appearing to read "L. P. Voigt", with a large, stylized flourish extending from the end.

L. P. Voigt
Secretary



State of Wisconsin \ PUBLIC SERVICE COMMISSION

20

December 18, 1973

WILLIAM F. EICH, CHAIRMAN
ARTHUR L. PADRUTT, COMMISSIONER
RICHARD D. CUDAHY, COMMISSIONER
JOHN F. GOETZ, SECRETARY
HILL FARMS STATE OFFICE BUILDING
MADISON, WISCONSIN 53702

FILE NO.

Dr. Alden McLellan
Space Science and Engineering Center
University of Wisconsin
Madison, Wisconsin 53706

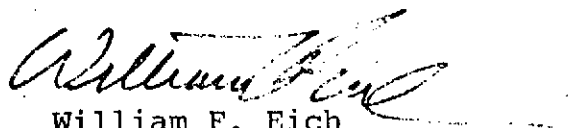
Dear Dr. McLellan:

This letter is to confirm Public Service Commission cooperation and participation with you in conjunction with your proposal, "Application of ERTS Data to Estimate Statewide Allocation of Distillate Fuels by Monitoring Snow-Cover Albedo."

As you know, Governor Lucey, in Executive Order No. 60, directed the Public Service Commission to engage in research regarding energy use in Wisconsin. I believe our cooperation with you in this project is consistent with this goal and, in addition, will serve as a useful tool in the regulation of public utilities under our jurisdiction.

We shall, to the extent possible, provide access to equipment and Commission personnel. Please let me know if I can be of further assistance to you.

Sincerely yours,


William F. Eich
Chairman

WFE:lh



State of Wisconsin \ OFFICE OF EMERGENCY ENERGY ASSISTANCE

21.

December 18, 1973

STANLEY YORK, DIRECTOR
4802 SHEBOYGAN AVENUE, ROOM 99A
MADISON, WISCONSIN 53702608/266-8234
800/362-8043

Dr. Alden McLellan
Space Science and Engineering Center
University of Wisconsin
Madison, Wisconsin 53706

Dear Dr. McLellan:

I have been apprised of your proposal "Application of ERTS Data to Estimate Statewide Allocation of Distillate Fuels by Monitoring Snow-Cover Albedo". This concept is consistent with the efforts of the Office of Emergency Energy Assistance as the designated state office to allocate distillate fuel use as described in the federal Mandatory Petroleum Allocation Regulations.

Recent federal legislation enables the continuous climatic monitoring potential of ERTS satellite data and imagery combined with other sources of data to be of significant import to this office in carrying out its assigned tasks in the best possible manner.

To this end, we will provide access to personnel time and experience to assist whenever possible in keeping with the policies established for this office. The particular thrust of your proposal has high potential value to both state and regional levels of planning.

Sincerely,

A handwritten signature in cursive script that reads "Stanley York".

Stanley York
Director

SY/sd

APPENDIX III

ERTS IMAGE DESCRIPTOR FORM

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

23.

DATE 1 February 1974

PRINCIPAL INVESTIGATOR James L. Clapp

GSFC UN 040

ORGANIZATION University of Wisconsin

NDPF USE ONLY

D _____

N _____

ID _____

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
1416162537				Alluvial Terrace
1416162537				Braided Stream
1416162514				City
1416162446				Conifer
1416162537				Cropland
1416162537				Dendritic Drainage
1416162537				Floodplain
1416162447				Forest
1416162517				Harbor
1416162515				Highways
1416162446				Island
1416162517				Kettle
1416162446				Lake
1416162537				Mature Stream
1416162517				Morainal Lake
1416162517				Moraine
1416162445				Peninsula
1416162517				River
1416162534				Valley

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO ERTS USER SERVICES
 CODE 563
 BLDG 23 ROOM E413
 NASA GSFC
 GREENBELT, MD. 20771
 301-982-5406

APPENDIX IV

DATA REQUEST FORMS

25
 D _____
 N _____
 ID _____
 AA _____
 TM _____

DATA REQUEST FORM

1. DATE 1/12/745. TELEPHONE NO. (608) 263-4789☐ NEW2. USER ID U 040

6. CATALOGUES DESIRED

STANDARD ☐ U.S. ☐ NON-U.S.DCS ☐MICROFILM ☐ U.S. ☐ NON-U.S.

4. SHIP TO:

ADDRESS J.L. Clapp☐ NEW658 WARF Bldg., U. of WIMadison, Wisconsin53706

APPROVAL TECHNICAL MONITOR _____

DDDHHEMS SERVATION ENTIFIER	G CENTER POINT COORDINATES	B SENSOR BAND	P PRODUCT TYPE	F PRODUCT FORMAT	T TICK MARKS	NN NUMBER OF COPIES	A AREA
037-16201	N45-36/W90-05	7	B	T		1	U
129-16322	N45-56/W92-55	7	B	T		1	U
144-16160	N43-01/W89-45	7	B	T		1	U
146-16264	N45-51/W91-31	7	B	T		1	U
163-16204	N45-54/W90-00	7	B	T		1	U
165-16321	N45-57/W92-50	7	B	T		1	U
182-16260	N47-19/W90-53	7	B	T		1	U
199-16210	N46-01/W90-02	7	B	T		1	U
200-16264	N46-01/W91-31	7	B	T		1	U
201-16320	N47-22/W92-21	7	B	T		1	U
201-16323	N45-57/W92-56	7	B	T		1	U
215-16100	N44-36/W87-51	7	B	T		1	U
217-16211	N46-0/W90-09	7	B	T		1	U
218-16263	N47-24/W91-00	7	B	T		1	U
237-16324	N45-59/W93-07	7	B	T		1	U
237-16322	N47-23/W92-31	7	B	T		1	U
323-16094	N44-42/W87-56	7	B	T		1	U
323-16100	N43-16/W88-28	7	B	T		1	U
360-16152	N43-06/W89-58	7	B	T		1	U
359-16094	N43-09/W88-27	7	B	T		1	U
416-16251	N45-59/W91-37	7	B	T		1	U
197-16095	N44-37/W87-39	7	B	T		1	U
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